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CLAIMS

[Claim(s)]

[Claim 1]In a battery pack having a cell, it comprises a mold body which fabricated with a cell a circuit component of a safeguard of a cell, or a charge-and-discharge control means which has either at least with a synthetic resin, A battery pack providing a conductive connection terminal with a cell use device on the surface of a mold body.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to a battery pack.

It is related with the battery pack excellent in especially waterproofness.

[0002]

[Description of the Prior Art]Portable electronic equipment including a cellular phone is used widely. The lithium ion battery and polymer lithium cell which are used for these apparatus, When excessive current flows like [it is few, and / when the terminal of a cell short-circuits], with the safeguard etc. which intercept energization, it used to be used with a cell simple substance as the battery pack stored to the housing made of a synthetic resin, and it has equipped electronic equipment, such as a cellular phone. In the battery pack, in order to give waterproofness to housing structure, the fitting part of two or more members which constitute a housing is equipped with the gasket which has elasticity, and preventing permeation of the water inside a battery pack is performed. For this reason, while it was required to provide the space for wearing of a gasket, problems, such as increase of the number of assemblers, were among two or more members which constitute a housing at the time of an assembly. When the elastic force of the gasket deteriorated, there was also a problem that waterproof performance fell.

[0003]In joining using adhesives, after [which constitutes a housing] applying adhesives to the joined part of one of one members at least, it is pasting up doubling an adhesion side. However, reform might become difficult, when adhesives were used, it needed to set right so that modification of each member would not arise, by the time it would harden, if cure time uses long adhesives, or cure time was conversely short and the gap arose. Adhesives overflowed the plane of composition into the outside of the housing, and adhered outside, and there was also a problem of spoiling a fine sight. In the battery pack of a cellular phone, since a part of structure of a cellular phone was constituted, generally it became complicated shape in many cases, and became what also has the complicated shape of the fitting part of the housing of a battery pack, and obtaining positive waterproof performance to a fitting surface had difficulty.

[0004]In the battery pack, the inside of a case is filled up with reactant hot melt resin, and the battery pack which performed immobilization in the case of a cell and adhesion of a case is proposed in JP,2000-243364,A. However, with the rechargeable battery, each conventional battery pack accommodated the means for protection of a rechargeable battery or charge and discharge control in the inside of the case made of a synthetic resin, and was manufactured. In these battery packs, since it was manufactured through means, such as welding by an ultrasonic wave, adhesion, and a screw clamp, in order to join a case with a case, the assembly process also became complicated.

[0005]

[Problem(s) to be Solved by the Invention] In a battery pack, the housing etc. which have a complicated fitting part do not need to be used for this invention, it has the positive waterproofness which does not deteriorate for a long period of time, and makes it a technical problem to provide a battery pack with easy manufacture moreover.

[0006]

[Means for Solving the Problem] In a battery pack having a cell, a technical problem of this invention comprises a mold body which fabricated with a cell a circuit component of a safeguard of a cell, or a charge-and-discharge control means which has either at least with a synthetic resin, It is the battery pack which provided a conductive connection terminal with a cell use device on the surface of a mold body. A thermal element is provided in a battery pack and a thermal element is the aforementioned battery pack which does not touch directly [a synthetic resin which constitutes a mold body]. A synthetic resin from which all the internal parts constitute a mold body is the aforementioned battery pack which does not touch directly. It is the aforementioned battery pack which formed an engagement part with a cell use device in a mold body by integral moulding. It is the aforementioned battery pack in which decoration is carried out to a mold body by integral moulding with a china-painting sheet.

[0007]

[Embodiment of the Invention] This invention provides the battery pack which formed in one the battery pack which formed the means for protection of a rechargeable battery and a rechargeable battery or charge and discharge control by the mold body by a synthetic resin. Conventionally, a battery pack is accommodated in the inside of the case made of a synthetic resin, and is manufactured, and fabricating a battery pack to one by the mold of a synthetic resin was not performed. The battery pack of this invention fabricates a cell to one with shaping of a synthetic resin with the circuit component which has a cell safeguard or a charge-and-discharge control means, without using the case made of a synthetic resin. Therefore, a perfect sealing structure object can be formed, and a battery pack with waterproof performance can be obtained, without using a case or taking the assembly of a case, and seal chemically-modified degree etc. Since cells inside a battery pack are intercepted with the open air, it also makes it possible to also reduce danger, such as ignition at the time of the abnormalities of a cell.

[0008] The battery pack of this invention is explained with reference to drawings below. Drawing 1 is a figure explaining one example of this invention, and shows a sectional view. The battery pack 1 of this invention has the circuit component 3 which becomes an inside from the cell 2 and a cell safeguard, or a charge-and-discharge control means, the circumference is covered by the mold body 4 made of a synthetic resin, and the conductive connection terminal 5 with a cell use device is formed in the surface of the mold body 4.

[0009] Drawing 2 is a figure explaining the manufacturing method of the battery pack of this invention. As shown in drawing 2 (A), the circuit component 3 which consists of the cell 2, a cell safeguard, or a charge-and-discharge control means, and the internal part 6 which consists of the conductive connection terminal 5 are produced. Subsequently, as shown in drawing 2 (B), the inside of the forming mold which comprised the upper dies 7 and the lower part mold 8 is equipped with the internal part 6, and the synthetic resin 9 which carried out heat melting inside the forming mold is poured in. The space formed in the upper dies 7 and the lower part mold 8, and the circumference of the internal part 6 is filled up with the poured-in synthetic resin 9. Subsequently, if it takes out from a metallic mold after the poured-in synthetic resin hardens, as shown in drawing 2 (C), the mold body 4 with which the internal part 6 was thoroughly covered with the synthetic resin will be obtained.

[0010] The manufacturing method of the mold body by a synthetic resin is performed by pressing fit in the inside of a metallic mold the synthetic resin fused with heating. In order for most heat of the synthetic resin which carried out heat melting to radiate heat through a metallic mold, the thermal influence of the internal parts on a cell etc. is small. However, in order to protect a cell generally to

an internal part at the time of overcharge and overdischarge. When are reached beyond a predetermined temperature and the temperature fuse which blows out and intercepts energization, or bigger current than predetermined current flows, thermal elements, such as PTC (right temperature-characteristics thermo sensitive register) which intercepts energization, are used. When these thermal elements are sensitive and are heated by high temperature to temperature, they have a possibility that an operating characteristic may get worse. Therefore, as for thermal elements, such as a temperature fuse and PTC, it is preferred to make it not contact the synthetic resin which carried out heat melting at the time of shaping, and directly.

[0011]Drawing 3 is a figure explaining other examples of this invention. Drawing 3 (A) shows a sectional view and drawing 3 (B) is a figure showing the section in an A-A' line in drawing 3 (A). The thermal elements 10A, such as PTC and a temperature fuse, are covered by the cover body 11 among the circuit components 3, and he is trying not to contact the thermal element 10B with the fused synthetic resin which is poured in by the thermal shield 12 in the battery pack 1 shown in drawing 3. Thus, when dividing a thermal element by the cover body or a screen and keeping the synthetic resin which carried out heat melting from carrying out direct contact to a thermal element at least among internal parts, degradation of the characteristic of a thermal element can be prevented.

[0012]It is preferred to use heat-resistant rubber with bigger heat resistance than the synthetic resin which heat resistance has elasticity greatly and can be recovered in the case of thermal modification of a thermal element and which is used for a mold as a cover body which performs thermal protection. As heat-resistant rubber, if it does not deteriorate or deteriorate when filled up with the synthetic resin which carried out heat melting, can use various kinds of heat-resistant rubbers, but. One sort specifically chosen from the group which consists of chloroprene rubber, ethylene propylene rubber, silicone rubber, and silicone modification ethylene propylene rubber can be mentioned. The sponge sheet which has cushioning properties also in such rubbers is preferred.

[0013]Although the synthetic resin which carried out heat melting showed the example kept from contacting a thermal element directly by drawing 3, it may be made for the synthetic resin which carried out heat melting also to the cell not to contact directly. Thermal influence on a cell can be prevented by doing in this way.

[0014]In the battery pack obtained by this invention, the synthetic resin inlet for mold body formation remains. When there are problems — inconvenience arises depending on the position of the synthetic resin inlet which remained at the time of handling, or a fine sight is spoiled — and the rear face of a battery pack or apparatus is equipped with a synthetic resin inlet, forming in the side which faces apparatus is preferred.

[0015]Drawing 4 is a figure explaining other examples of this invention, and is a figure explaining the inlet part of a synthetic resin. In the upper dies 7, it has the shape where the synthetic resin inlet 14 is established in the crevice 13 formed in the mold body 4 of a battery pack. It becomes unnecessary for this to perform polish etc. of the cutting plane of the synthetic resin inlet formed in the mold body 4. The battery pack of this invention can mention the thing of not only the thing of the shape of rectangular parallelepiped shape as shown above but various kinds of shape.

[0016]Drawing 5 is a figure explaining other examples of this invention. The outside surface 12 of the mold body 4 of the battery pack 1 is located on the lower part mold 6, and the outside surface 15 is formed in the mold body 4 of the synthetic resin which touches the lower part mold 6. The engagement part 16 to the cell use device equipped with a battery pack is formed in the mold body 4. By this, like a cellular phone, when a part of cell use device is equipped with a battery pack, it can be made a part of outside surface of a cell use device. At the time of shaping of the battery pack of this invention, the decorating sheet printed beforehand may be arranged and decoration may be carried out to the inside of a metallic mold by the desired color and a pattern layer. By such a method, after pouring in resin into a metallic mold, the base of a china-painting sheet can be exfoliated, and a pattern can be transferred, or it can unite with the resin which fabricated the

china-painting sheet, and the decoration of the battery pack surface can be carried out simultaneously with shaping of a battery pack.

[0017]As a synthetic resin used for shaping of the battery pack of this invention, although various kinds of synthetic resins can be used, polyamide resin, an epoxy resin, etc. are preferred. Since especially dimer acid system polyamide resin has 135–180 °C of softening temperatures, the viscosity 1400 – the characteristic of 1800 mPa·s and can pour them in from an inlet with the transfer pressure of about 1 MPa, A battery pack can be manufactured without having an adverse effect on the rechargeable battery inside a battery pack, or an inner component at the time of shaping.

[0018]

[Effect of the Invention]Since the battery pack of this invention produced the battery pack by formation of the mold body of a synthetic resin, the process of not needing the synthetic resin Plastic solid for the housings of a battery pack, and joining a case is unnecessary, and the reduction of a man day of it is attained. Since it is formed of the mold body of the synthetic resin, it can also perform giving a waterproof function easily. Since it is molded into one, it becomes possible to improve the shock by fall etc. Since air is intercepted, the inside of a battery pack can also decrease danger, such as ignition and emitting smoke.

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TECHNICAL FIELD

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PRIOR ART

[Description of the Prior Art] Portable electronic equipment including a cellular phone is used widely. The lithium ion battery and polymer lithium cell which are used for these apparatus, When excessive current flows like [it is few, and / when the terminal of a cell short-circuits], with the safeguard etc. which intercept energization, it used to be used with a cell simple substance as the battery pack stored to the housing made of a synthetic resin, and it has equipped electronic equipment, such as a cellular phone. In the battery pack, in order to give waterproofness to housing structure, the fitting part of two or more members which constitute a housing is equipped with the gasket which has elasticity, and preventing permeation of the water inside a battery pack is performed. For this reason, while it was required to provide the space for wearing of a gasket, problems, such as increase of the number of assemblers, were among two or more members which constitute a housing at the time of an assembly. When the elastic force of the gasket deteriorated, there was also a problem that waterproof performance fell.

[0003] In joining using adhesives, after [which constitutes a housing] applying adhesives to the joined part of one of one members at least, it is pasting up doubling an adhesion side. However, reform might become difficult, when adhesives were used, it needed to set right so that modification of each member would not arise, by the time it would harden, if cure time uses long adhesives, or cure time was conversely short and the gap arose. Adhesives overflowed the plane of composition into the outside of the housing, and adhered outside, and there was also a problem of spoiling a fine sight. In the battery pack of a cellular phone, since a part of structure of a cellular phone was constituted, generally it became complicated shape in many cases, and became what also has the complicated shape of the fitting part of the housing of a battery pack, and obtaining positive waterproof performance to a fitting surface had difficulty.

[0004] In the battery pack, the inside of a case is filled up with reactant hot melt resin, and the battery pack which performed immobilization in the case of a cell and adhesion of a case is proposed in JP,2000-243364,A. However, with the rechargeable battery, each conventional battery pack accommodated the means for protection of a rechargeable battery or charge and discharge control in the inside of the case made of a synthetic resin, and was manufactured. In these battery packs, since it was manufactured through means, such as welding by an ultrasonic wave, adhesion, and a screw clamp, in order to join a case with a case, the assembly process also became complicated.

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EFFECT OF THE INVENTION

[Effect of the Invention]Since the battery pack of this invention produced the battery pack by formation of the mold body of a synthetic resin, the process of not needing the synthetic resin Plastic solid for the housings of a battery pack, and joining a case is unnecessary, and the reduction of a man day of it is attained. Since it is formed of the mold body of the synthetic resin, it can also perform giving a waterproof function easily. Since it is molded into one, it becomes possible to improve the shock by fall etc. Since air is intercepted, the inside of a battery pack can also decrease danger, such as ignition and emitting smoke.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]In a battery pack, the housing etc. which have a complicated fitting part do not need to be used for this invention, it has the positive waterproofness which does not deteriorate for a long period of time, and makes it a technical problem to provide a battery pack with easy manufacture moreover.

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MEANS

[Means for Solving the Problem]In a battery pack having a cell, a technical problem of this invention comprises a mold body which fabricated with a cell a circuit component of a safeguard of a cell, or a charge-and-discharge control means which has either at least with a synthetic resin, It is the battery pack which provided a conductive connection terminal with a cell use device on the surface of a mold body. A thermal element is provided in a battery pack and a thermal element is the aforementioned battery pack which does not touch directly [a synthetic resin which constitutes a mold body]. A synthetic resin from which all the internal parts constitute a mold body is the aforementioned battery pack which does not touch directly. It is the aforementioned battery pack which formed an engagement part with a cell use device in a mold body by integral moulding. It is the aforementioned battery pack in which decoration is carried out to a mold body by integral moulding with a china-painting sheet.

[0007]

[Embodiment of the Invention]This invention provides the battery pack which formed in one the battery pack which formed the means for protection of a rechargeable battery and a rechargeable battery or charge and discharge control by the mold body by a synthetic resin. Conventionally, a battery pack is accommodated in the inside of the case made of a synthetic resin, and is manufactured, and fabricating a battery pack to one by the mold of a synthetic resin was not performed. The battery pack of this invention fabricates a cell to one with shaping of a synthetic resin with the circuit component which has a cell safeguard or a charge-and-discharge control means, without using the case made of a synthetic resin. Therefore, a perfect sealing structure object can be formed, and a battery pack with waterproof performance can be obtained, without using a case or taking the assembly of a case, and seal chemically-modified degree etc. Since cells inside a battery pack are intercepted with the open air, it also makes it possible to also reduce danger, such as ignition at the time of the abnormalities of a cell.

[0008]The battery pack of this invention is explained with reference to drawings below. Drawing 1 is a figure explaining one example of this invention, and shows a sectional view. The battery pack 1 of this invention has the circuit component 3 which becomes an inside from the cell 2 and a cell safeguard, or a charge-and-discharge control means, the circumference is covered by the mold body 4 made of a synthetic resin, and the conductive connection terminal 5 with a cell use device is formed in the surface of the mold body 4.

[0009]Drawing 2 is a figure explaining the manufacturing method of the battery pack of this invention. As shown in drawing 2 (A), the circuit component 3 which consists of the cell 2, a cell safeguard, or a charge-and-discharge control means, and the internal part 6 which consists of the conductive connection terminal 5 are produced. Subsequently, as shown in drawing 2 (B), the inside of the forming mold which comprised the upper dies 7 and the lower part mold 8 is equipped with the internal part 6, and the synthetic resin 9 which carried out heat melting inside the forming mold is poured in. The space formed in the upper dies 7 and the lower part mold 8, and the circumference

of the internal part 6 is filled up with the poured-in synthetic resin 9. Subsequently, if it takes out from a metallic mold after the poured-in synthetic resin hardens, as shown in drawing 2 (C), the mold body 4 with which the internal part 6 was thoroughly covered with the synthetic resin will be obtained.

[0010]The manufacturing method of the mold body by a synthetic resin is performed by pressing fit in the inside of a metallic mold the synthetic resin fused with heating. In order for most heat of the synthetic resin which carried out heat melting to radiate heat through a metallic mold, the thermal influence of the internal parts on a cell etc. is small. However, in order to protect a cell generally to an internal part at the time of overcharge and overdischarge, When are reached beyond a predetermined temperature and the temperature fuse which blows out and intercepts energization, or bigger current than predetermined current flows, thermal elements, such as PTC (right temperature-characteristics thermo sensitive register) which intercepts energization, are used. When these thermal elements are sensitive and are heated by high temperature to temperature, they have a possibility that an operating characteristic may get worse. Therefore, as for thermal elements, such as a temperature fuse and PTC, it is preferred to make it not contact the synthetic resin which carried out heat melting at the time of shaping, and directly.

[0011]Drawing 3 is a figure explaining other examples of this invention. Drawing 3 (A) shows a sectional view and drawing 3 (B) is a figure showing the section in an A-A' line in drawing 3 (A). The thermal elements 10A, such as PTC and a temperature fuse, are covered by the cover body 11 among the circuit components 3, and he is trying not to contact the thermal element 10B with the fused synthetic resin which is poured in by the thermal shield 12 in the battery pack 1 shown in drawing 3. Thus, when dividing a thermal element by the cover body or a screen and keeping the synthetic resin which carried out heat melting from carrying out direct contact to a thermal element at least among internal parts, degradation of the characteristic of a thermal element can be prevented.

[0012]It is preferred to use heat-resistant rubber with bigger heat resistance than the synthetic resin which heat resistance has elasticity greatly and can be recovered in the case of thermal modification of a thermal element and which is used for a mold as a cover body which performs thermal protection. As heat-resistant rubber, if it does not deteriorate or deteriorate when filled up with the synthetic resin which carried out heat melting, can use various kinds of heat-resistant rubbers, but. One sort specifically chosen from the group which consists of chloroprene rubber, ethylene propylene rubber, silicone rubber, and silicone modification ethylene propylene rubber can be mentioned. The sponge sheet which has cushioning properties also in such rubbers is preferred.

[0013]Although the synthetic resin which carried out heat melting showed the example kept from contacting a thermal element directly by drawing 3, it may be made for the synthetic resin which carried out heat melting also to the cell not to contact directly. Thermal influence on a cell can be prevented by doing in this way.

[0014]In the battery pack obtained by this invention, the synthetic resin inlet for mold body formation remains. When there are problems -- inconvenience arises depending on the position of the synthetic resin inlet which remained at the time of handling, or a fine sight is spoiled -- and the rear face of a battery pack or apparatus is equipped with a synthetic resin inlet, forming in the side which faces apparatus is preferred.

[0015]Drawing 4 is a figure explaining other examples of this invention, and is a figure explaining the inlet part of a synthetic resin. In the upper dies 7, it has the shape where the synthetic resin inlet 14 is established in the crevice 13 formed in the mold body 4 of a battery pack. It becomes unnecessary for this to perform polish etc. of the cutting plane of the synthetic resin inlet formed in the mold body 4. The battery pack of this invention can mention the thing of not only the thing of the shape of rectangular parallelepiped shape as shown above but various kinds of shape.

[0016]Drawing 5 is a figure explaining other examples of this invention. The outside surface 12 of the mold body 4 of the battery pack 1 is located on the lower part mold 6, and the outside surface

15 is formed in the mold body 4 of the synthetic resin which touches the lower part mold 6. The engagement part 16 to the cell use device equipped with a battery pack is formed in the mold body 4. By this, like a cellular phone, when a part of cell use device is equipped with a battery pack, it can be made a part of outside surface of a cell use device. At the time of shaping of the battery pack of this invention, the decorating sheet printed beforehand may be arranged and decoration may be carried out to the inside of a metallic mold by the desired color and a pattern layer. By such a method, after pouring in resin into a metallic mold, the base of a china-painting sheet can be exfoliated, and a pattern can be transferred, or it can unite with the resin which fabricated the china-painting sheet, and the decoration of the battery pack surface can be carried out simultaneously with shaping of a battery pack.

[0017]As a synthetic resin used for shaping of the battery pack of this invention, although various kinds of synthetic resins can be used, polyamide resin, an epoxy resin, etc. are preferred. Since especially dimer acid system polyamide resin has 135–180 °C of softening temperatures, the viscosity 1400 – the characteristic of 1800 mPa·s and can pour them in from an inlet with the transfer pressure of about 1 MPa, A battery pack can be manufactured without having an adverse effect on the rechargeable battery inside a battery pack, or an inner component at the time of shaping.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]Drawing 1 is a figure explaining one example of this invention.

[Drawing 2]Drawing 2 is a figure explaining the manufacturing method of the battery pack of this invention.

[Drawing 3]Drawing 3 is a figure explaining other examples of this invention.

[Drawing 4]Drawing 4 is a figure explaining other examples of this invention.

[Drawing 5]Drawing 5 is a figure explaining other examples of this invention.

[Description of Notations]

1 [-- A mold body, 5 / -- Conductive connection terminal,] -- A battery pack, 2 -- A cell, 3 -- A circuit component, 4 6 [-- A synthetic resin, 10A, 10B / -- A thermal element, 11 / -- A cover body, 12 / -- A thermal shield, 13 / -- A crevice, 14 / -- A synthetic resin inlet, 15 / -- The outside surface of a mold body 16 / -- Engagement part] -- An internal part, 7 -- Upper dies, 8 -- A lower part mold, 9

[Translation done.]

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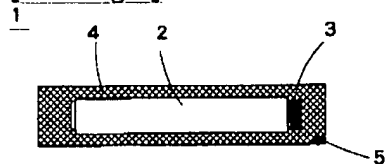
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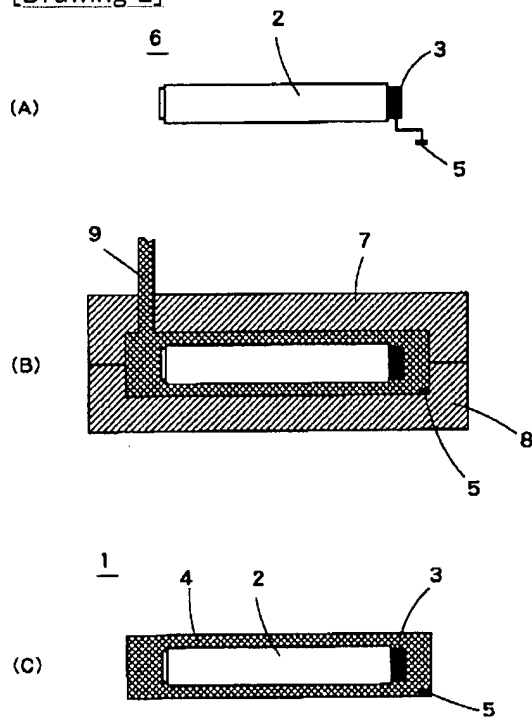
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DRAWINGS

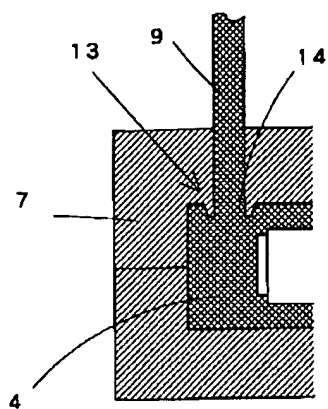
[Drawing 1]



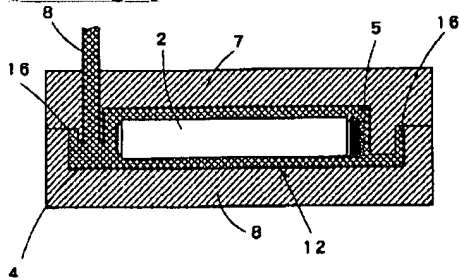
[Drawing 2]



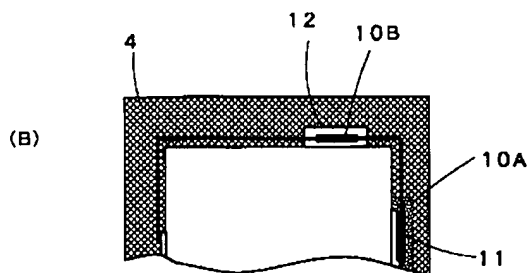
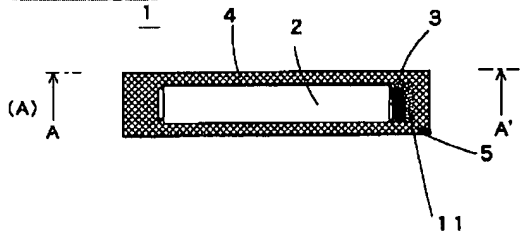
[Drawing 4]



[Drawing 5]



[Drawing 3]



[Translation done.]

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-373630

(43)Date of publication of application : 26.12.2002

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H01M 2/10

(21)Application number : 2001-178208

(71)Applicant : NEC TOKIN TOCHIGI LTD

(22)Date of filing : 13.06.2001

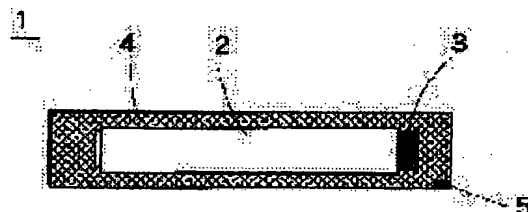
(72)Inventor : KASAI MASAKATSU

(54) BATTERY PACK

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a battery pack superior in waterproofness or the like.

SOLUTION: In the battery pack 1 including a cell 2, the cell 2 and a conductive connection terminal 5 between a battery, using apparatus and a circuit component 3 having at least a protection means or a charge/discharge control means are provided inside a mold body formed by synthetic resin and on a surface of the mold body.



(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

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特開2002-373630

(P2002-373630A)

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識別記号

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弁理士 米澤 明 (外7名)

Fターム(参考) 5H040 AA03 AA32 AS12 AY04 CC13

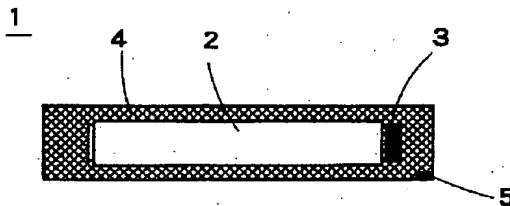
DD26 JJ05

(54) 【発明の名称】 電池パック

(57) 【要約】 (修正有)

【課題】 防水性等に優れた電池パックを提供する。

【解決手段】 電池2を内蔵した電池パック1において、電池2と共に電池の保護手段もしくは充放電制御手段の少なくともいずれか一方を有する回路部品3と電池使用機器との導電接続端子5とを合成樹脂によって成形したモールド体内及びモールド体の表面に設けた電池パック。



【特許請求の範囲】

【請求項1】 電池を内蔵した電池パックにおいて、電池と共に電池の保護手段もしくは充放電制御手段の少なくともいずれか一方を有する回路部品を合成樹脂によって成形したモールド体から構成され、モールド体の表面に電池使用機器との導電接続端子を設けたことを特徴とする電池パック。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、電池パックに関するものであり、とくに防水性に優れた電池パックに関するものである。

【0002】

【従来の技術】携帯電話を始めとした携帯型の電子機器が広く利用されている。これらの機器に用いられるリチウムイオン電池、ポリマーリチウム電池は、電池単体で用いられることは少なく、電池の端子が短絡された場合のように過大な電流が流れた際に通電を遮断する安全装置等とともに合成樹脂製の筐体に収納した電池パックとし携帯電話等の電子機器に装着している。電池パックでは、筐体構造に防水性を付与するために、筐体を構成する複数の部材の嵌合部に弾性を有するガスケットを装着し、電池パック内部への水の浸入を防止することが行われている。このために、筐体を構成する複数の部材には、ガスケットの装着用の空間を設けることが必要であるとともに、組立時に組立工数の増大等の問題があった。また、ガスケットの弾性力が劣化すると、防水性能が低下するという問題点もあった。

【0003】また、接着剤を用いて接合する場合には、筐体を構成する少なくともいずれかの一方の部材の接合部に接着剤を塗布した後に、接着面を合わせて接着を行っている。ところが、接着剤を用いる場合には、硬化時間が長い接着剤を使用すると硬化するまでに各部材の変形が生じないように矯正を行う必要が生じたり、逆に硬化時間が短い場合には、ずれが生ずると矯正が困難となることがあった。また、接着剤が接合面から筐体の外側にはみ出し外面に付着し、美観を損なうという問題もあった。更には、携帯電話の電池パックでは、携帯電話の構造体の一部を構成するために、一般に複雑な形状となることが多く、電池パックの筐体の嵌合部の形状も複雑なものとなり、嵌合面に確実な防水性能を得ることは困難があった。

【0004】また、電池パックにおいて、反応性ホットメルト樹脂を筐体内部に充填して、電池の筐体への固定と筐体の接着を行った電池パックが特開2000-243364において提案されている。しかしながら、従来の電池パックは、いずれも二次電池とともに二次電池の保護、あるいは充放電制御のための手段を、合成樹脂製の筐体内部に收容して製造されていた。これらの電池パックにおいては、筐体と共に筐体を接合するために超音

波による溶着、接着、ねじ止め等の手段を経て製造されているために、組立工程も複雑なものとなっていた。

【0005】

【発明が解決しようとする課題】本発明は、電池パックにおいて、複雑な嵌合部を有する筐体等を用いる必要がなく、長期間劣化することがない確実な防水性を有し、しかも製造が容易な電池パックを提供することを課題とするものである。

【0006】

【課題を解決するための手段】本発明の課題は、電池を内蔵した電池パックにおいて、電池と共に電池の保護手段もしくは充放電制御手段の少なくともいずれか一方を有する回路部品を合成樹脂によって成形したモールド体から構成され、モールド体の表面に電池使用機器との導電接続端子を設けた電池パックである。電池パック内には熱的素子が設けられており、熱的素子はモールド体を構成する合成樹脂とは直接的には接触していない前記の電池パックである。全ての内蔵部品がモールド体を構成する合成樹脂とは直接的には接触していない前記の電池パックである。モールド体には、電池使用機器との係合部を一体成形によって形成した前記の電池パックである。モールド体には、絵付けシートとの一体成形によって加飾されている前記の電池パックである。

【0007】

【発明の実施の形態】本発明は、二次電池、および二次電池の保護、あるいは充放電制御のための手段を設けた電池パックを合成樹脂によるモールド体によって一体に形成した電池パックを提供するものである。従来、電池パックは、合成樹脂製の筐体内部に收容して製造されており、電池パックを合成樹脂のモールドによって一体に成形することは行われることはなかった。本発明の電池パックは、合成樹脂製の筐体を用いることなく、電池を電池保護手段もしくは充放電制御手段等を有する回路部品とともに、合成樹脂の成形によって一体に成形したものである。したがって、完全な密封構造体を形成することができ、筐体を用いたり、筐体の組立、密封化工程等を採ることなく、防水性能を有した電池パックを得ることができる。また、電池パック内部の電池等は外気と遮断されるので、電池の異常時における発火等の危険性も軽減することも可能とするものである。

【0008】以下に本発明の電池パックを図面を参照して説明する。図1は、本発明の一実施例を説明する図であり断面図を示す。本発明の電池パック1は、内部に電池2、および電池保護手段もしくは充放電制御手段等からなる回路部品3を有しており、周囲を合成樹脂製のモールド体4で覆われており、モールド体4の表面には電池使用機器との導電接続端子5が設けられている。

【0009】図2は、本発明の電池パックの製造方法を説明する図である。図2(A)に示すように、電池2と電池保護手段もしくは充放電制御手段からなる回路部品

3、導電接続端子5からなる内蔵部品6を作製する。次いで、図2(B)に示すように、内蔵部品6を上部金型7および下部金型8から構成された成形金型内部に装着し、成形金型内部へ加熱溶融した合成樹脂9を注入する。注入された合成樹脂9は、上部金型7および下部金型8と、内蔵部品6の周囲に形成された空間に充填される。次いで、注入された合成樹脂が硬化した後に、金型から取り出すと、図2(C)に示すように、内蔵部品6が合成樹脂によって完全に覆われたモールド体4が得られる。

【0010】合成樹脂によるモールド体の製造方法は、加熱によって溶融した合成樹脂を金型内部に圧入することによって行われる。加熱溶融した合成樹脂の熱の大部分は、金型を通じて放熱されるために、電池等の内蔵部品への熱的な影響は小さい。しかしながら、内蔵部品には、一般に過充電、過放電時に電池を保護するために、所定の温度以上に達すると溶断して通電を遮断する温度フューズ、あるいは所定の電流よりも大きな電流が流れた場合には通電を遮断するPTC（正温度特性サーミスタ）等の熱的素子が用いられている。これらの熱的素子は、温度に対して敏感であり、高温に加熱されると動作特性が悪化するおそれがある。したがって、温度フューズ、PTC等の熱的素子は、成形時に加熱溶融した合成樹脂と直接に接触しないようにすることが好ましい。

【0011】図3は、本発明の他の実施例を説明する図である。図3(A)は、断面図を示し、図3(B)は、図3(A)において、A-A'線での断面を示す図である。図3に示す電池パック1においては、回路部品3のうちPTC、温度フューズ等の熱的素子10Aは、被覆体11で覆われており、また熱的素子10Bは、熱遮蔽体12によって注入される溶融した合成樹脂とは接触しないようにされている。このように、内蔵部品のうち少なくとも熱的素子を、被覆体あるいは遮蔽体によって区画し、加熱溶融した合成樹脂が熱的素子に直接に接触しないようにすることにより熱的素子の特性の劣化を防止することができる。

【0012】熱的な保護を行う被覆体としては、耐熱性が大きく弾性を有し、熱的素子の熱的な変形の際に回復可能な、モールドに使用する合成樹脂よりも耐熱性が大きな耐熱性のゴムを用いることが好ましい。耐熱性ゴムとしては、加熱溶融した合成樹脂を充填する際に変質、あるいは劣化しないのであれば各種の耐熱性ゴムを用いることができるが、具体的には、クロロブレンゴム、エチレンプロピレンゴム、シリコンゴム、シリコン変性エチレンプロピレンゴムからなる群から選ばれる1種を挙げることができる。これらのゴムのなかでもクッション性を有するスポンジシートが好ましい。

【0013】図3では、加熱溶融した合成樹脂が熱的素子に直接に接触しないようにする例を示したが、電池に対して加熱溶融した合成樹脂が直接に接触しないよう

にしても良い。このようにすることにより、電池に対する熱的な影響を防止することができる。

【0014】本発明によって得られた電池パックには、モールド体形成用の合成樹脂注入口が残存する。残存した合成樹脂注入口の位置によっては、取り扱い時に不都合が生じたり美観が損なわれる等の問題がある場合には、合成樹脂注入口を電池パックの裏面、あるいは機器に装着した場合には機器に面する側に形成することが好ましい。

10 【0015】図4は、本発明の他の実施例を説明する図であり、合成樹脂の注入口部を説明する図である。上部金型7には、電池パックのモールド体4に形成される凹部13に合成樹脂注入口14が設けられるような形状を有している。これによって、モールド体4に形成される合成樹脂注入口の切断面の研磨等を行う必要がなくなる。本発明の電池パックは、以上に示したような直方体状の形状のものに限らず、各種の形状のものを挙げることができる。

20 【0016】図5は、本発明の他の実施例を説明する図である。下部金型6上に電池パック1のモールド体4の外表面12が位置し、下部金型6と接する合成樹脂のモールド体4に外表面15が形成される。また、モールド体4には、電池パックを装着する電池使用機器への係合部16が形成される。これによって、携帯電話等のように、電池使用機器の一部に電池パックを装着した際には電池使用機器の外表面の一部とすることができる。また、本発明の電池パックの成形時には、金型内部に、あらかじめ印刷した絵付シートを配置し、所望の色、図柄層によって加飾しても良い。このような方法によって、金型内に

30 樹脂を注入した後に、絵付けシートを剥離して、図柄を転写したり、あるいは絵付けシートを成形した樹脂と一体化することができ、電池パックの成形と同時に電池パック表面を加飾することができる。

【0017】本発明の電池パックの成形に使用する合成樹脂としては、各種の合成樹脂を用いることができるが、ポリアミド樹脂、エポキシ樹脂等が好ましい。特に、ダイマー酸系ポリアミド樹脂は、軟化点135～180℃、粘度1400～1800mPa・sの特性を有しており、1MPa程度の注入圧力によって注入口から

40 注入することができるので、電池パック内部の二次電池、あるいは内部部品に成形時に悪影響を及ぼすことなく電池パックを製造することができる。

【0018】

【発明の効果】本発明の電池パックは、合成樹脂のモールド体の形成によって電池パックを作製したので、電池パックの筐体用の合成樹脂成形体を必要とせず、また筐体の接合を行う工程が不要であり、工数の削減が可能となる。また、合成樹脂のモールド体によって形成されているので、防水機能を付与することも容易に行うことができる。また、一体に成型されているので、落下等によ

る衝撃を向上することが可能となる。さらに、電池パック内部は、空気が遮断されているので、発火、発煙等の危険性も減少させることができる。

【図面の簡単な説明】

【図1】図1は、本発明の一実施例を説明する図である。

【図2】図2は、本発明の電池パックの製造方法を説明する図である。

【図3】図3は、本発明の他の実施例を説明する図である。

【図4】図4は、本発明の他の実施例を説明する図であ

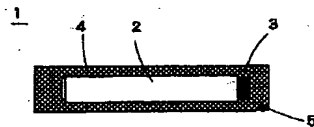
＊る。

【図5】図5は、本発明の他の実施例を説明する図である。

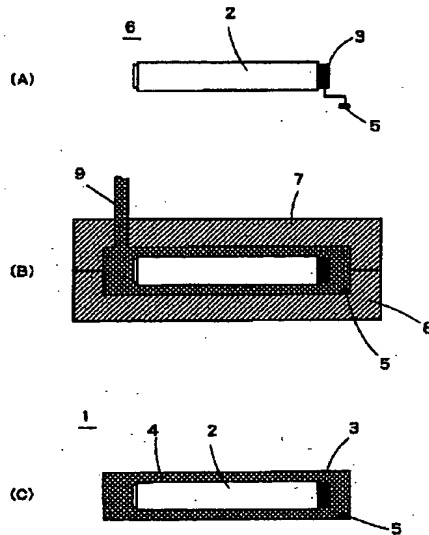
【符号の説明】

1…電池パック、2…電池、3…回路部品、4…モールド体、5…導電接続端子、6…内蔵部品、7…上部金型、8…下部金型、9…合成樹脂、10A、10B…熱的素子、11…被覆体、12…熱遮蔽体、13…凹部、14…合成樹脂注入口、15…モールド体の外面、16…係合部

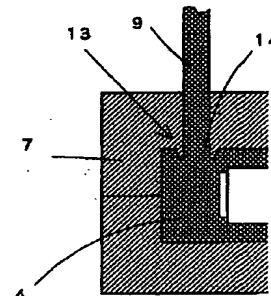
【図1】



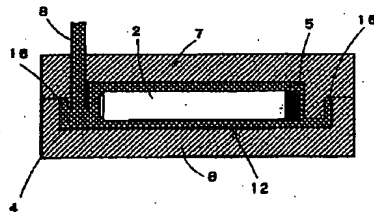
【図2】



【図4】



【図5】



【図3】

